BRIEFER ARTICLES.

Zannichellia palustris L.—Prof. Stanley Coulter's account, in the May number, of a certain pond and its contents is quite interesting to us in Montana. All the more so because we have a remarkable spring near Great Falls, known as the Giant Spring. This spring really seems to be the outlet of an underground river, the flow of water is so great and so strong It discharges immediately into the Missouri river, midway between the Black Eagle and the Coulter Falls, and has a river frontage of 500 feet. Upon a future occasion I hope to make some mention of the various forms of plant life therein found. Zannichellia palustris grows there in abundance, and may be found in flower from May to September, and yet the temperature of the water is only about 52° F., and does not seem to vary with that of the atmosphere. So far as my own observations have gone, the stems of these plants with the flowers and fruit when growing in this spring are nearly always buried in sand, only the slender grass-like leaves waving above. And yet, covered up and packed in fine mud and sand as these plants are, their essential organs perform their functions unfailingly, and a prolific crop of fruit may be found each season. When the flowers are covered up in this manner they are always pale, often white, tinged with flesh-color, but when growing exposed to the light are olivaceous and the covering of the nutlets is thicker and stronger —F. W. ANDERSON, *Helena, Montana.*

Coloring the nuclei of living cells.—The most interesting fact brought out in my work at Tübingen is the fact that several aniline colors have the property of coloring the nucleus of many plant cells without killing them. That the living nucleus can be stained has been demonstrated by several observers in the case of animal cells,[1] but as far as I now know it has not hitherto been observed in plant cells. Though the work is not yet completed, it will perhaps be interesting to give briefly some of the processes by which the results were obtained, and some of the objects employed.

The first color used was dahlia, a violet-purple pigment by whose aid Lavalette[2] had succeeded in coloring living spermatozoa and the nuclei of sperm-cells. The most favorable object so far found by me is the nucleus of the cells of stamen hairs of Tradescantia. T. Virginica was principally used, but other species gave equally good results. Hairs should be chosen from young buds, as these are perfectly colorless, not having developed the colored cell-sap of the older hairs. The sepals and petals are removed, and the stamens thus exposed are plunged into an aqueous solution of the

[1] See Pfeffer, "Uber Aufnahme von Anilinfarben in lebende Zellen," Unters. aus dem bot. Institut, Tübingen, 1886. Also, Strasburger, "Botanisches Practicum," fourth edition.

[2] Strasburger, Bot. Pract., fourth edition.

dahlia. After an immersion of from half an hour to three or four hours, or even much longer, depending on the strength of the solution, it will be found that in many cases the nuclei are more or less deeply colored; and that the cell is not killed is evinced by the continuance of the protoplasmic streaming. It is quite surprising to see how deeply the nucleus is often stained without killing the cell. A nucleus so colored appears perfectly normal, there being no distortion or change beyond the change in color. As yet I have not studied especially what parts of the nucleus are colored, but it appears to be the nucleolus and microsomes only, as in the case of cells that have first been killed and then stained according to the ordinary methods.

Among other objects that have given more or less satisfactory results were the hairs from the base of the perianth of Lilium bulbiferum; stamen-hairs of Aspleodelus albus; leaves of Elodea Canadensis and Vallisneria spiralis; root-hairs of Trianea Bogatensis, Cucurbita Pepo, Tradescantia zebrina; spermatozoids of Chara and a fern (probably Blechnum). In all cases cells were chosen in which there was evident protoplasmic movement, in order that there might be a certain means of determining whether or not the cell was still living.

Similar and usually quite as good results were also obtained with mauvein and methyl-violet, both colors closely resembling dahlia. Usually a .1% solution was made, and this diluted with from 50 to 1,000 parts of water, according to circumstances. Some doubtful results were obtained with other colors, but too uncertain to warrant recording.—DOUGLAS H. CAMPBELL, *Tübingen.*

The absorption of aniline colors by living cells.—About a year ago Pfeffer[1] published the results of a rather extended series of experiments showing that, contrary to the ordinarily accepted idea, various aniline colors can be absorbed in large quantities by living cells. I wish here merely to call attention to some easily made but instructive experiments bearing on the subject. Pfeffer's experiments were mostly made with methylen-blue and methyl-violet, though numerous other colors were also tried. Among colors not employed by him I found that dahlia and mauvein, both very similar to methyl violet, were quite as good and acted much in the same way. The yellow color chrysoidin also gave good results. No very satisfactory results were obtained with red pigments, though in some cases safranin, tropœolin and fuchsin gave tolerably good coloring, but either it was too diffuse, or the cell-wall was more deeply colored than the contents.

With methylen-blue either the cell-sap is colored, often very intensely, e. g., root-hairs of Trianea Bogatensis, or a precipitate is formed in the cell-sap, e. g., Spirogyra. If vesicles of tannic acid are present, as is the case

[1] Untersuchungen aus dem botan. Institut in Tübingen, 1886. "Uber Aufnahme von Anilinfarben in lebende Zellen."